P 2.1.5 P 2.2 P 6.1

62-1804 (5M 1-68)

D-31

1.0 SCOPE

This standard establishes the limits of acceptability for non-destructive inspection (except visual inspection) of production welding; and for destructive and non-destructive testing for welders. It also covers procedures for preparing test specimens for destructive testing and the testing of the specimens.

2.0 STANDARD OF ACCEPTABILITY - NON-DESTRUCTIVE TESTING

2.1 Introduction

2.1.1 These standards of acceptability are applicable to the determination of the size and type of defects located by radiography and other non-destructive test methods, including visual inspection.

2.1.2 Any defect exceeding the limits outlined classify the weld as unacceptable.

2.1.3 The visual inspection requirements of Paragraph 2.2 apply only to welder qualification test welds. Refer to Gas Standard D-40 for visual inspection requirements for production welding.

2.1.4 Welds which are to be destructively tested should not be subjected to non-destructive testing other than the visual inspection requirements of Paragraph 2.2.

2.1.5 Radiographic procedure shall be as outlined in Standard D-33. Radiography is not normally used on lines smaller than ~~6"~~ 4" DIAMETER

2.1.6 Since radiographic test methods give two dimensional results only, the Company may reject welds which appear to meet these standards of acceptability if in the opinion of the inspector, the depth of the defect may be detrimental to the strength of the weld.

2.2 Visual - Welder Qualifications Test Welds Only (See Standard D-40 for production welds)

The weld ~~must be free of~~ SHALL CONTAIN NO cracks, inadequate penetration, unrepaired burn through, and other defects, and must present a neat workmanlike appearance. External undercut shall not exceed 1/32" depth or 12-1/2 percent of the pipe wall thickness, whichever is smaller, and there shall not be more than 2 inches of undercutting in any continuous 12" of weld. (Also see Par. 2.10). Any weld not meeting these requirements shall be failed without further testing.

CHG.	DATE	DESCRIPTION	APPRD.	CHG.	DATE	DESCRIPTION	APPRD.
1	6-79	REVISED PARAGRAPH 6.2 & ADDED SH 11.					
0	12-77	SUPERSEDES 084508					

APPROVED

BY		PIPING - DATA SHEET STANDARDS OF ACCEPTABILITY NON-DESTRUCTIVE & DESTRUCTIVE TESTING GAS STANDARD PACIFIC GAS AND ELECTRIC COMPANY	SUPERSEDES 084508 SUPERSEDED BY SHEET NO. 1 OF 11 SHEETS
DSGN.			
DR.			
CH.			
O.K.			DRAWING NUMBER 086433 / CHANGE 1
DATE 11-29-76	SCALE		

PRINTED ON DIEPO NO. 1000H CLEARPRINT 4-71

2.3 Inadequate Penetration

Inadequate penetration is the incomplete filling of the weld root with weld metal. Types of inadequate penetration are as follows:

2.3.1 Inadequate Penetration of Weld Root

Inadequate penetration without high-low present is the incomplete filling of the weld root. A schematic representation of this condition is given on page 12 (Drawing 085177 (A)). Any individual condition due to this type of inadequate penetration shall not exceed 1 inch. The total length of such condition in any continuous 12-Inch length of weld shall not exceed 1 inch. If the weld is less than 12 inches long, then the total length of such condition shall not exceed 8 percent of the weld length.

2.3.2 Inadequate Penetration Due to High-Low

High-low is a condition where the pipe and/or fitting surfaces are misaligned. This situation is represented schematically on page 12 (Drawing 085177 (B) and (C)). High-low is not objectionable provided that the end preparation meets the requirements on Drawing 084033 (page 8 of Standard D-22) and the root of adjacent pipe and/or fitting joints is completely tied in (bonded) by weld metal (Drawing 085177 Item (C)). When one edge of the root is exposed (or unbonded), the length of this condition shall not exceed 2 inches at individual locations or 3 inches in any continuous 12-Inch length of weld (Drawing 085177 (B)).

2.3.3 Internal Concavity

Internal concavity as used in this standard shall mean a bead which is properly fused to and completely penetrates the pipe wall thickness along both sides of the bevel, but the center of the bead is less than flush with the inside surface of the pipe wall. Internal concavity is associated with a continuously deposited weld bead, and it differs from burn-through areas which are associated with intermittently deposited weld metal. The magnitude of concavity shall be defined as the perpendicular distance between an axial extension of the pipe wall surface and the lowest weld bead surface point. It is shown schematically on page 12 (Drawing 085177 (D)).

Internal concavity is allowable provided the density of the radiographic image does not exceed that of the adjacent base metal. If the density exceeds that of the base metal, dimensions of such areas shall not exceed those specified for burn-through in sections 2.5.1 and 2.5.2.

2.4 Incomplete Fusion

2.4.1 Incomplete fusion is the lack of bond between beads or between weld metal and base metal. Incomplete fusion at the root of the joint or at the top of the joint between the weld and the base metal (see page 12, Drawing 085177 (E)) shall not exceed 1 inch in length. The total length of such conditions in any 12-Inch length of weld metal shall not exceed 1 inch. If the weld is less than 12 inches long, then the total length of such conditions shall not exceed 8 percent of the weld length.

2.4.2 Incomplete Fusion Due to Cold Lap

Incomplete fusion due to cold lap is a discontinuity between two adjacent weld beads or between a weld bead and the base metal. For the purposes of this standard, incomplete fusion due to cold lap is a subsurface discontinuity and thus it differs from incomplete fusion referred to in Par. 2.5.1. Incomplete fusion due to cold lap is depicted schematically on page 12 (Drawing 085177 (F)). Individual incomplete fusion due to cold lap discontinuities shall not exceed 2 inches in length. The total length of incomplete fusion due to cold lap in any continuous 12-Inch length of weld shall not exceed 2 inches.

2.5 Burn-Through

A burn-through is that portion of the root bead where excessive penetration has caused the weld puddle to be blown into the pipe. This is usually caused by too much space in fit-up.

2.5.1 For Pipe 2-3/8 Inches O.D. and Larger

Any unrepaired burn-through shall not exceed 1/4 inch or the thickness of the pipe wall, whichever is smaller, in any dimension. The sum of the maximum dimensions of separate unrepaired burn-through in any continuous 12 inch length of weld shall not exceed 1/2 inch.

2.5.2 For Pipe Less Than 2-3/8 Inches O.D

No more than one unrepaired burn-through is acceptable and it shall not exceed 1/4 inch or the thickness of the pipe wall, whichever is the smaller, in any dimension.

2.5.3 Radiographs of repaired burn-throughs shall show that these have been properly repaired. Burn-through shall be considered to have been acceptably repaired if the density of the radiographic image of the burn-through does not exceed that of the adjacent base metal.

2.6 Slag Inclusions

A slag inclusion is a nonmetallic solid entrapped in weld metal, or between the weld metal and the pipe metal. Elongated slag inclusions are usually found at the fusion zone. Isolated slag inclusions are irregularly shaped inclusions and may be located anywhere in the weld.

2.6.1 Elongated Slag Inclusions (Wagon Tracks)

2.6.1.1 For Pipe 2-3/8 Inches O.D. and Larger

Any elongated slag inclusions shall not exceed 2 inches in length or 1/16 inch in width. The total length of elongated slag inclusions in any continuous 12 inch length of weld shall not exceed 2 inches. Parallel slag lines shall be considered as separate conditions if the width of either exceeds 1/32 inch.

2.6.1.2 For Pipe Less Than 2-3/8 Inch O.D.

Individual elongated slag inclusions shall not exceed 1/16 inch in width, or three times the nominal wall thickness in length. Parallel slag lines shall be considered as separate conditions if the width of either one of them exceeds 1/32 inch.

2.6.2 Isolated Slag Inclusions

2.6.2.1 For Pipe 2-3/8 Inch O.D. and Larger

The maximum width of any isolated slag inclusions shall not exceed 1/8 inch. The total length of isolated slag inclusions in any continuous 12 inch length of the weld shall not exceed 1/2 inch, nor shall there be more than four isolated slag inclusions of the maximum width of 1/8 inch in this length.

2.6.2.2 For Pipe Less Than 2-3/8 Inches O.D.

The maximum width of any isolated slag inclusions shall not exceed 1/2 the nominal wall thickness and the total length of such inclusions shall not exceed twice the nominal wall thickness.

2.7 Porosity or Gas Pockets

Porosity or gas pockets are voids occurring in the weld metal.

2.7.1 Spherical Porosity

The maximum dimension of any individual spherical gas pocket shall not exceed 1/8 inch or 25 percent of the pipe wall thickness, whichever is the lesser. The maximum distribution of spherical porosity shall not exceed that shown in Drawing 084025 and 084026 (page 18 and 17 of this Standard).

2.7.2 Cluster Porosity

Cluster porosity which occurs in the finish pass shall not exceed an area of 1/2 inch in diameter with the maximum dimensions of any individual gas pocket within the cluster not to exceed 1/16 inch. The total length of cluster porosity in any continuous 12-Inch length of weld shall not exceed 1/2 inch. Cluster porosity occurring in all other passes shall comply with Paragraph 2.7.1.

2.7.3 Piping (Wormhole) Porosity

Piping (Wormhole) porosity is an elongated discontinuity which results when the gas rises through the solidifying weld metal. The maximum dimension of the radiographic image associated with wormhole porosity shall not exceed 1/8 inch or 25 percent of the pipe wall thickness, whichever is the lesser. The maximum distribution for wormhole porosity shall not exceed that shown on pages 18 or 17 (Drawings 084025 and 084026). The orientation of this discontinuity will substantially affect the density of the radiographic image, and when applying these limits, consideration shall be given to the provisions of Par. 2.1.6 (Right of Rejection).

2.7.4 Hollow Bead

Hollow bead is elongated linear porosity occurring in the root pass. The maximum length of this discontinuity shall not exceed 1/2 inch. The total length of hollow bead in any continuous 12-Inch length of weld metal shall not exceed 2 inches, and individual adjacent discontinuity exceeding 1/4 inch in length shall be separated by at least 2 inches of sound weld metal.

2.8 Cracks

Shallow crater cracks or star cracks which are located at the stopping point of weld beads and which are the result of weld metal contraction during solidification are not considered injurious defects unless their length exceeds 5/32 inches. With the exception of these shallow crater cracks, no weld containing cracks, regardless of size or location, shall be acceptable.

2.9 Accumulation of Discontinuities

Excluding high-low condition, any accumulation of discontinuities having a total length of more than 2 inches in a continuous weld length of 12 inches, or more than 8 percent of a continuous weld length if the total weld length is less than 12 inches, is unacceptable. Any accumulation of discontinuities which total more than 8 percent of the weld length associated with an entire joint is unacceptable.

2.10 Undercutting

Undercutting is the burning away of the side walls of the welding groove at the edge of a layer of weld metal, or the reduction in the thickness of the pipe wall adjacent to the weld and where it is fused to the surface of the pipe.

Undercutting adjacent to the cover bead on the outside of the pipe shall not be V-shaped and shall not exceed the following dimensions:

Depth	Length
1/32 In. or 12-1/2 percent of the pipe wall thickness whichever is smaller.	Not acceptable
Above 1/64 In. to 1/32 In. or 6 to 12-1/2 percent of the pipe wall thickness whichever is smaller.	2 In. or 1/6 the length of the weld whichever is smaller.
1/64 In. or 6 percent of the pipe wall thickness whichever is smaller.	Acceptable regardless of length.

Undercutting may be determined by visual, mechanical or non-destructive test methods.

Where there is evidence of internal undercutting adjacent to the root bead, the same standards of acceptability shall apply; except that the procedure outlined in Section 6.9 of the 13th Edition (1973) of API 1104 for the determination of the depth of internal undercutting solely by radiography, using a comparator shim, is not to be used. The depth limitations for internal undercutting adjacent to the root bead apply only if:

a) The depth is visually determined by use of a depth measuring device on all undercutting along the entire circumference of the weld, and

b) Visual determination of internal undercutting is made in all pipe of the same diameter in a pipeline except where impracttical at tie-in welds.

3.0 STANDARDS OF ACCEPTABILITY - DESTRUCTIVE TESTING

3.1 Introduction

These standards of acceptability allow a mechanical evaluation of a test weld. Before destructively testing a weld, it must meet visual inspection requirements as outlined in Par. 2.2. Other than these visual requirements, the standards of acceptability for non-destructive testing (Section 2) shall not be applied to destructive test specimens.

All test specimens shall be air cooled to ambient temperature before being tested.

3.2 Tensile Strength of Butt Welds

3.2.1 Preparation

The specimens (Drawing 283709, Page 15 of this Standard) shall be a minimum of 9" long and approximately 1 inch wide. They may be machine-cut or torch-cut. Sides must be smooth and parallel. If necessary, the sides shall be machined.

3.2.2 Method

Tensile test specimens shall be ruptured under tensile load. The tensile strength shall be computed by dividing the maximum load at failure by the least cross-sectional area of the specimen as measured before load is applied.

3.2.3 Requirements

The tensile strength of the weld including the fusion zone of each specimen shall be equal to or greater than the specified minimum tensile strength of the pipe material, but need not be greater than the actual tensile strength of the pipe material. If the specimen breaks outside the weld and fusion zone (i.e. in parent pipe material) and meets the specified minimum tensile strength for the pipe material, the weld is acceptable.

If the specimen breaks in the weld or fusion zone and the observed strength is equal to or greater than the specified minimum tensile strength of the pipe material and meets the Nick-Break test requirements (Par. 3.3.3), the weld is acceptable.

If the specimen breaks below the specified minimum tensile strength of the pipe material, the weld shall be set aside and a new test weld made.

3.3 Nick-Break Test (Butt Welds)

3.3.1 Preparation

The specimens (Drawing 283709, page 15 of this Standard) shall be a minimum of 9" long and approximately 1 inch wide. They may be machine-cut or torch-cut. They shall be notched with a hacksaw on each side at the center of the weld. Each notch shall be approximately 1/8 inch deep.

Nick-break specimens prepared in this manner from welds made with certain automatic and semiautomatic process may fail through the pipe instead of the weld. When this occurs, the external reinforcement may be notched to a depth not to exceed 1/16 inch measured from the original weld surface.

3.3.2 Method

The specimens shall be broken by pulling in a tensile machine or by supporting the ends and striking the center. The exposed area of the fracture shall be at least 3/4 inch wide.

3.3.3 Requirements

The exposed surfaces of each specimen shall show complete penetration and fusion and(a) there shall be no more than six gas pockets per square inch of surface area with the greatest dimension not to exceed 1/16 inch, (b) slag inclusions shall not be more than 1/32 inch in depth nor 1/8 inch or one-half the nominal wall thickness in length, whichever is shorter, and there shall be at least 1/2 inch of sound weld metal between adjacent inclusions. The dimensions should be measured as shown in Drawing 083976 (Page 16).

3.4 Root and Face Bend Test (Butt Welds)

3.4.1 Preparation

The specimens (Drawing 283709, Page 15 of this Standard), shall be at least 9 inches long by 1 inch wide and the long edges shall be rounded. They may be machine-cut or torch-cut. The cover pass and root bead reinforcement shall be ground or machined flush with the surface of the specimen. These surfaces shall be smooth and any scratches which exist shall be light and transverse to the weld.

3.4.2 Method

The specimens shall be bent in a guided bend test jig similar to that shown in Drawing 084109, Standard M-26.

Each specimen shall be placed on the die with the weld at the mid-span. Face bend specimens shall be placed with the face of the weld directed toward the gap and root bend specimens shall be placed with the root of the weld directed toward the gap. The plunger shall be forced into the gap until the curvature of the specimen is approximately U-shaped.

3.4.3 Requirements

The bend test shall be considered acceptable if no crack or other defect exceeding 1/8 inch or 1/2 the nominal wall thickness, whichever is smaller, in any direction is present in the weld or between the weld and the fusion zone after bending. Cracks which originate along the edges of the specimen during testing and which are less than 1/4 inch measured in any direction shall not be considered unless obvious defects are observed. Each specimen subjected to the bend test shall meet these requirements.

3.5 Side Bend Test (Butt Welds)

3.5.1 Preparation

The specimens (Drawing 283709, Page 15) shall be at least 9 inches long by 1/2 inch wide and the long edges shall be rounded. They shall be machine-cut or they may be torch-cut to approximately a 3/4 inch width and then machined or ground to the 1/2 inch width. The sides shall be smooth and parallel. The cover and root bead reinforcements shall be ground or machined flush with the surfaces of the specimen.

3.5.2 Method

The specimens shall be bent in a guided bend test jig, similar to that shown in Drawing 084109 (Standard M-26). Each specimen shall be placed on the die with the weld at mid-span and with the face of the weld at 90 degrees to the gap. The plunger shall be forced into the gap until the curvature of the specimen is approximately U-shaped.

3.5.3 Requirements

Each specimen shall meet the Face and Root Bend Test Requirement, Paragraph 3.4.3.

4.0 DESTRUCTIVE TESTING OF WELDED JOINTS - BRANCH WELDS

4.1 Preparation

Specimens shall be cut from the joint at the locations shown in Drawing 086406 (Page 4 of Standard D-30.2). The minimum number of specimens are also given in Drawing 086406.

4.2 Method

Prepare and break specimens as indicated on Drawing 084024 (Page 14 of this Standard).

5.0 REPAIR OR REMOVAL OF DEFECTS (FOR PRODUCTION WELDS)

Each weld that does not meet the Standards of Acceptability, Section 2 of this Standard, shall be repaired or removed.

For new construction, a weld must be removed if it has a crack that is more than two inches or that penetrates either the root or second bead. For operating lines, see Standard A-65.

Each weld that is repaired must have the defect removed down to clean metal and the segment to be repaired must be preheated. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability. If the repair is not acceptable, the weld must be removed.

6.0 RECORDS

6.1 Inspection and Test Reports for Pipeline Welds

✓ OK.

6.1.1. Divisions ~~are requested to~~ MAY arrange with the Gas Construction Department to handle all radiographic testing.

6.1.2 Record of number of welds inspected must be retained for the life of the facility (See Standard D-40).

6.2 Employee Qualification and Requalification Records

6.2.1 Records for all welders who have been qualified under this Standard shall be retained as outlined below.

6.2.2 All Employee Qualification and Requalification records must be retained for a minimum duration of five years.

6.2.3 All Employee Qualification and Requalification records must be retained through temporary lapses in a welder's qualification.

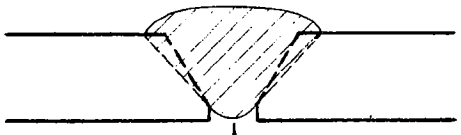
6.2.4 The Record shall be made by completing the form specified in the Standard covering the procedure for which the welder is qualified.

7.0 WELD INSPECTORS

7.1 All weld inspections shall be performed by persons qualified to inspect welds as stated in Standard D-40.

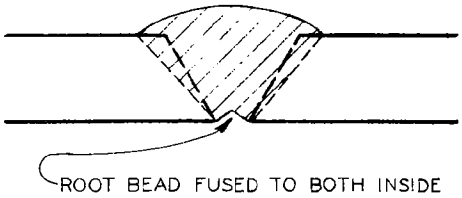
7.2 Welder Qualification or Requalification tests shall be performed in the presence of a qualified welding inspector. The inspector shall insure that these test welds meet visual inspection requirement. of Paragraph 3.2 and that they are performed in accordance with the Welding Procedure.

ONE OR BOTH BEVELS
MAY BE INADEQUATELY
FILLED AT INSIDE SURFACE



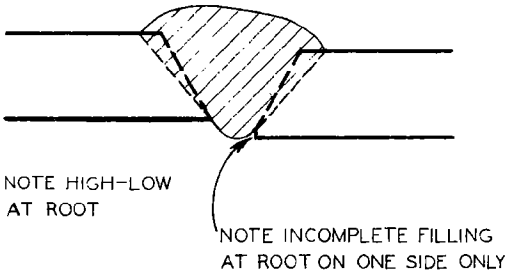
INADEQUATE PENETRATION OF WELD GROOVE

(A)



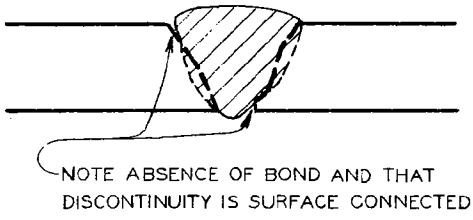
INADEQUATE PENETRATION DUE TO
INTERNAL CONCAVITY

(D)



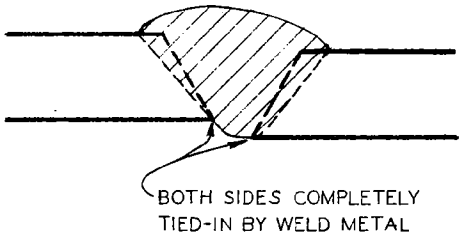
INADEQUATE PENETRATION DUE
TO HIGH-LOW

(B)



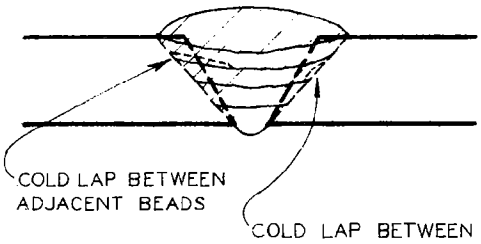
INCOMPLETE FUSION AT ROOT OF
BEAD OR TOP OF THE JOINT

(E)



ACCEPTABLE WELD
PENETRATION ADEQUATE
WITH HIGH - LOW PRESENT

(C)



NOTE: COLD LAP IS NOT SURFACE CONNECTED

INCOMPLETE FUSION DUE TO COLD LAP

(F)

APPROVED BY	CHG.	DATE	DESCRIPTION	GM	BY	CH.	APP'D.
	3	6-79	Corrected Spelling to Groove		HF	MC	
	2	12-76	Transfered from D-31 Pg 37				
	1	4-73	Title Revised		A.C.		

SUPV. BY
DSGN.
DR [redacted]
CH
O.

DATE 12-70 | SCALE NONE

PIPING-DETAILS
INADEQUATE PENETRATION AND INCOMPLETE FUSION OF WELD
GAS STANDARD
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

DRAWING LIST
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS

DRAWING NUMBER 085177 | CHANGE 3

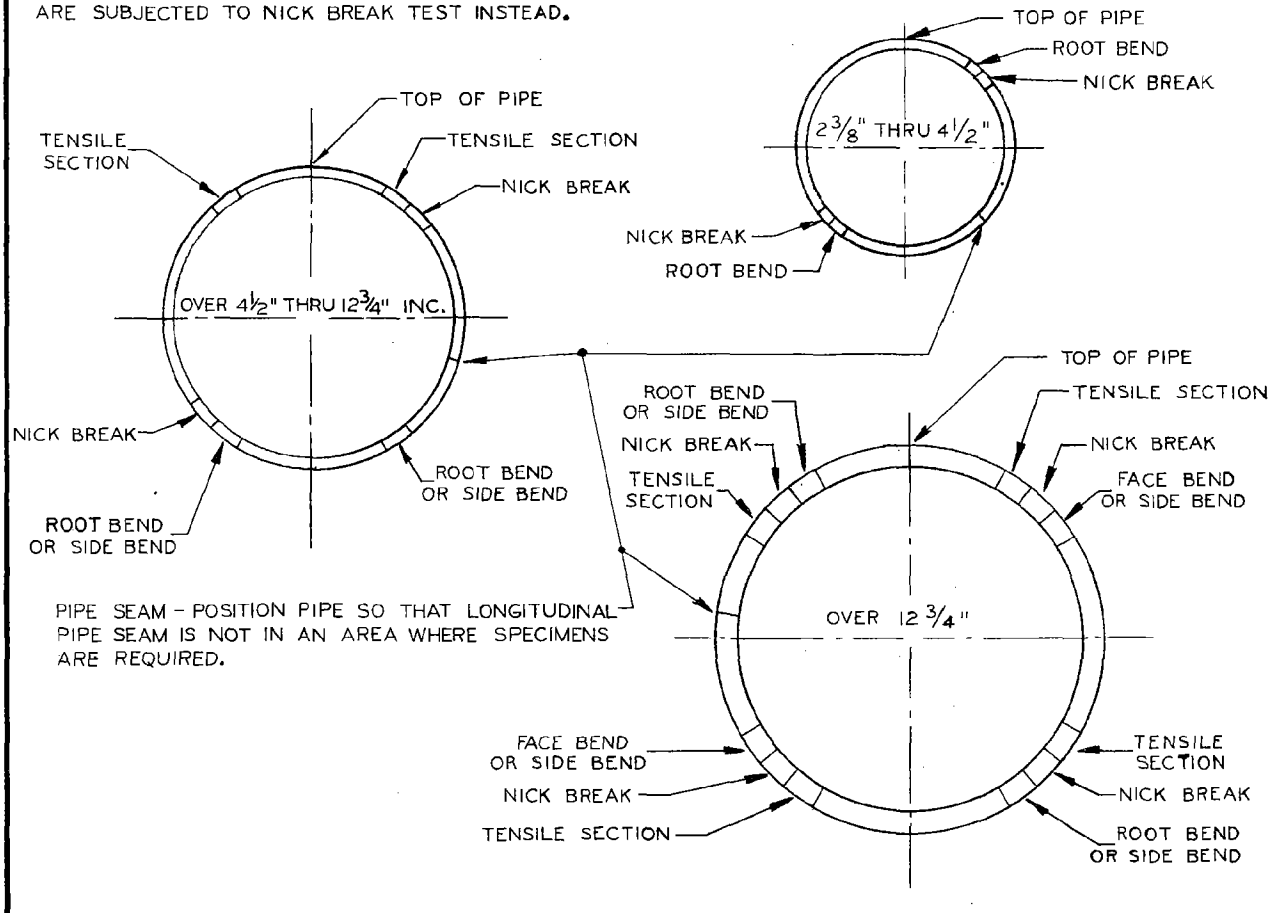
PRINTED ON DIEPO NO. 1000H CLEARPRINT 2-69

NOTE:
SPECIMENS SHALL NOT INCLUDE THE PIPE SEAM WELD.

TYPE AND NUMBER OF TEST SPECIMENS

PIPE SIZE, O.D. - INCHES	TENSILE *	NICK BREAK	ROOT BEND	FACE BEND	SIDE BEND	TOTAL
WALL THICKNESS - 1/2" AND UNDER						
2 3/8 THRU 4 1/2	0	2	2	0	0	4
OVER 4 1/2 THRU 12 3/4	2	2	2	0	0	6
OVER 12 3/4	4	4	2	2	0	12
WALL THICKNESS - OVER 1/2"						
OVER 4 1/2 THRU 12 3/4	2	2	0	0	2	6
OVER 12 3/4	4	4	0	0	4	12

*TENSILE TEST MAY BE OMITTED IF SPECIMENS DESIGNATED FOR TENSILE TEST ARE SUBJECTED TO NICK BREAK TEST INSTEAD.



PIPE SEAM - POSITION PIPE SO THAT LONGITUDINAL PIPE SEAM IS NOT IN AN AREA WHERE SPECIMENS ARE REQUIRED.

FOR WELDERS QUALIFICATION TEST WELD

CHG.	DATE	DESCRIPTION	GM	BY	CH.	APPD.
4	3-11-80	REMOVED FACE BEND FROM 4 1/2" - 12 3/4" SKETCH				
3	12-20-76	REMOVED REFERENCE TO G0112C. RMVD. SMALL DIAMETERS		RP	HF	
2	2-4-72	REV. FOR COMPUTER LISTING & ADD G.O. 112C REF.			M.C.	
1	3-10-71	CHANGED PAGE NO. TO 25				

APPROVED BY

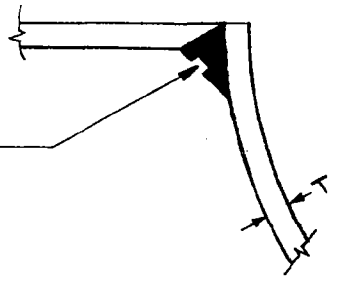
SUPV. BY DEPT. OF G. O.
DSGN.
DR. [redacted]
CH.
O.K.
DATE 12-24-64
SCALE NONE

PIPING - DATA SHEET
LOCATION OF BUTT WELD TEST SPECIMENS
GAS STANDARD

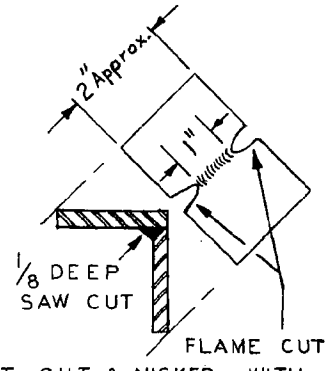
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

DRAWING LIST
SUPERSEDES 083466 SH. 3
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 084027
CHANGE 4

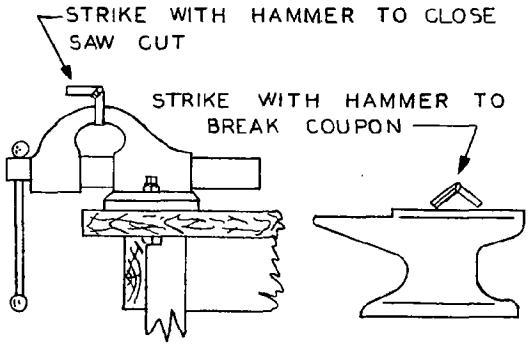
PRINTED ON DIEPO NO. 1000H CLEARPRINT



MAY BE MACHINE OR TORCH CUT SPECIMEN. SHOULD BE AT LEAST 2 INCHES LONG AND ONE INCH WIDE.



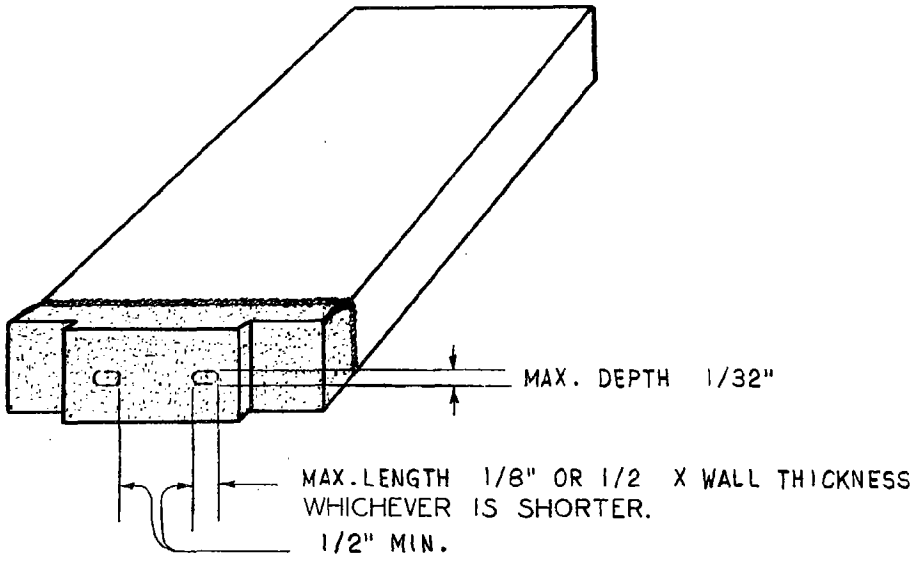
MAY BE CUT OUT & NICKED WITH TORCH
DO NOT REMOVE WELD REINFORCEMENT



NICK-BREAK OF SPECIMENS FROM BRANCH WELD TEST (ARC WELDER QUALIFICATION FOR OVER 20% OF S.M.Y.S.). SEE STANDARD D-30.2, PAGE 4 FOR NUMBER AND LOCATION OF SPECIMENS.

APPROVED BY							
	2	12-20-76	REVISED TITLE, ELIMINATED UNNEEDED DETAILS		R.P.	H.F.	
	1	3-10-71	CHANGED PAGE NO. TO 34				
	CHG.	DATE	DESCRIPTION	GM	BY	CH.	APP'D.

SUPV. BY DEPT. OF G.O.	PIPING - DATA SHEET	DRAWING LIST	
DSGN.	PREPARATION OF	SUPERSEDES	
DR. [redacted]	BRANCH WELD SPECIMENS	SUPERSEDED BY	
CH.	GAS STANDARD	SHEET NO.	SHEETS
O.K.	PACIFIC GAS AND ELECTRIC COMPANY	DRAWING NUMBER	CHANGE
DATE 1-5-65 / SCALE NONE	SAN FRANCISCO, CALIFORNIA	084024	2



EVALUATION OF SLAG INCLUSIONS IN WELD AFTER NICK-BREAK HAS BEEN MADE.

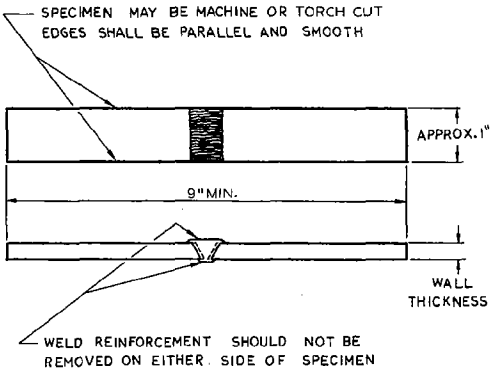
APPROVED BY							
	2	12-8-76	REVISED TITLE		R.P		
	1	3-10-71	CHANGED PAGE NO TO 35				
	CHG.	DATE	DESCRIPTION	GM	BY	CH.	APPD.

SUPV. BY
DSGN.
R. [redacted]
D.
O.K.
DATE 12-15-64 SCALE NONE

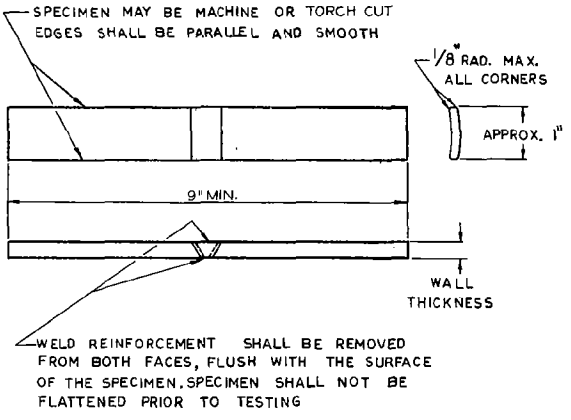
PIPING - DETAILS
DIMENSIONS OF DISCONTINUITIES IN NICK-BREAK SPECIMENS

GAS STANDARD
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

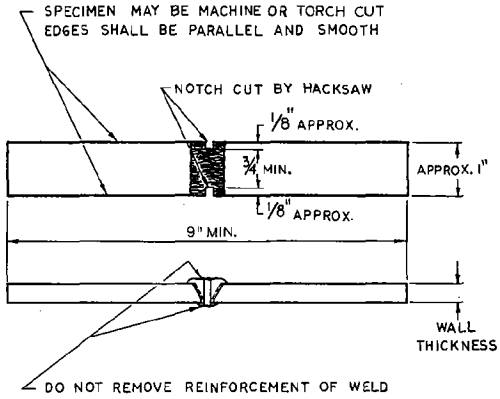
DRAWING LIST
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 083976 CHANGE 2

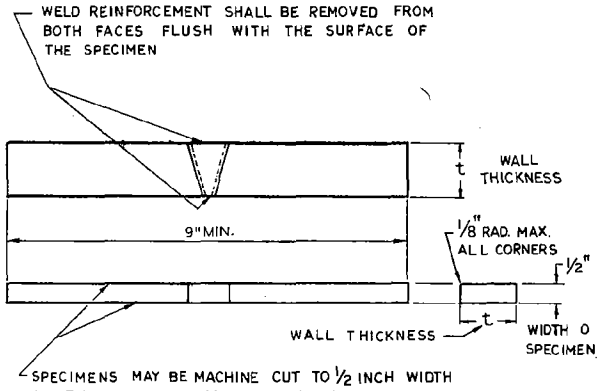


TENSILE TEST SPECIMEN

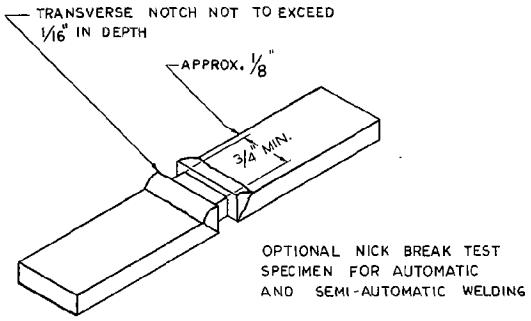


ROOT BEND AND FACE BEND TEST SPECIMEN

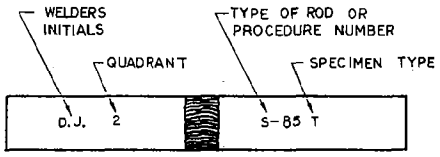




SIDE BEND TEST SPECIMEN



NICK BREAK TEST SPECIMEN



WHEN SENDING SPECIMENS TO DEPARTMENT OF ENGINEERING RESEARCH IDENTIFY SAMPLES FROM A SINGLE QUALIFICATION AND BIND TOGETHER. FILL OUT FORM No. 75-292 AND INCLUDE WITH SPECIMEN

IDENTITY OF SPECIMEN

APPROVED	CHG.	DATE	DESCRIPTION	BY.	CH.	APPRD.
	2	10-27-76	Revised Title, Width of Opt. Nick Break Chg'd from "Approx. 3/4"", Length of Specimens Revised.			
	1	3-10-71	CHANGED PAGE NO. TO 26			

SUPERV. BY	
DSGN.	
DR. J.A.M.	
CH.	
O.K.	
DATE	JUNE 9-70
SCALE	NONE

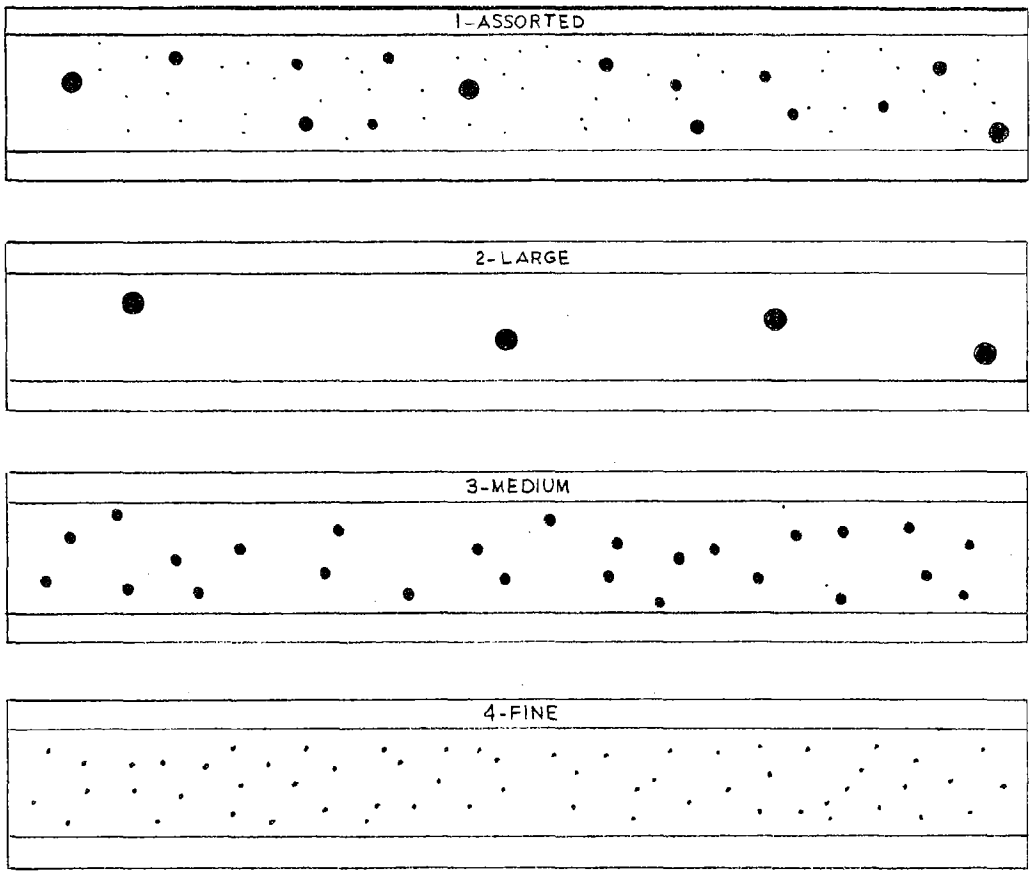
PIPING – DATA SHEET

PREPARATION OF WELD TEST SPECIMENS

GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

SUPERSEDES	084800
SUPERSEDED BY	
SHEET NO.	SHEETS
DRAWING NUMBER	CHANGE
283709	2



T = PIPE WALL THICKNESS

NOTE: SEE SECTION 2.8 FOR MAXIMUM ALLOWABLE SIZE OF GAS POCKETS.

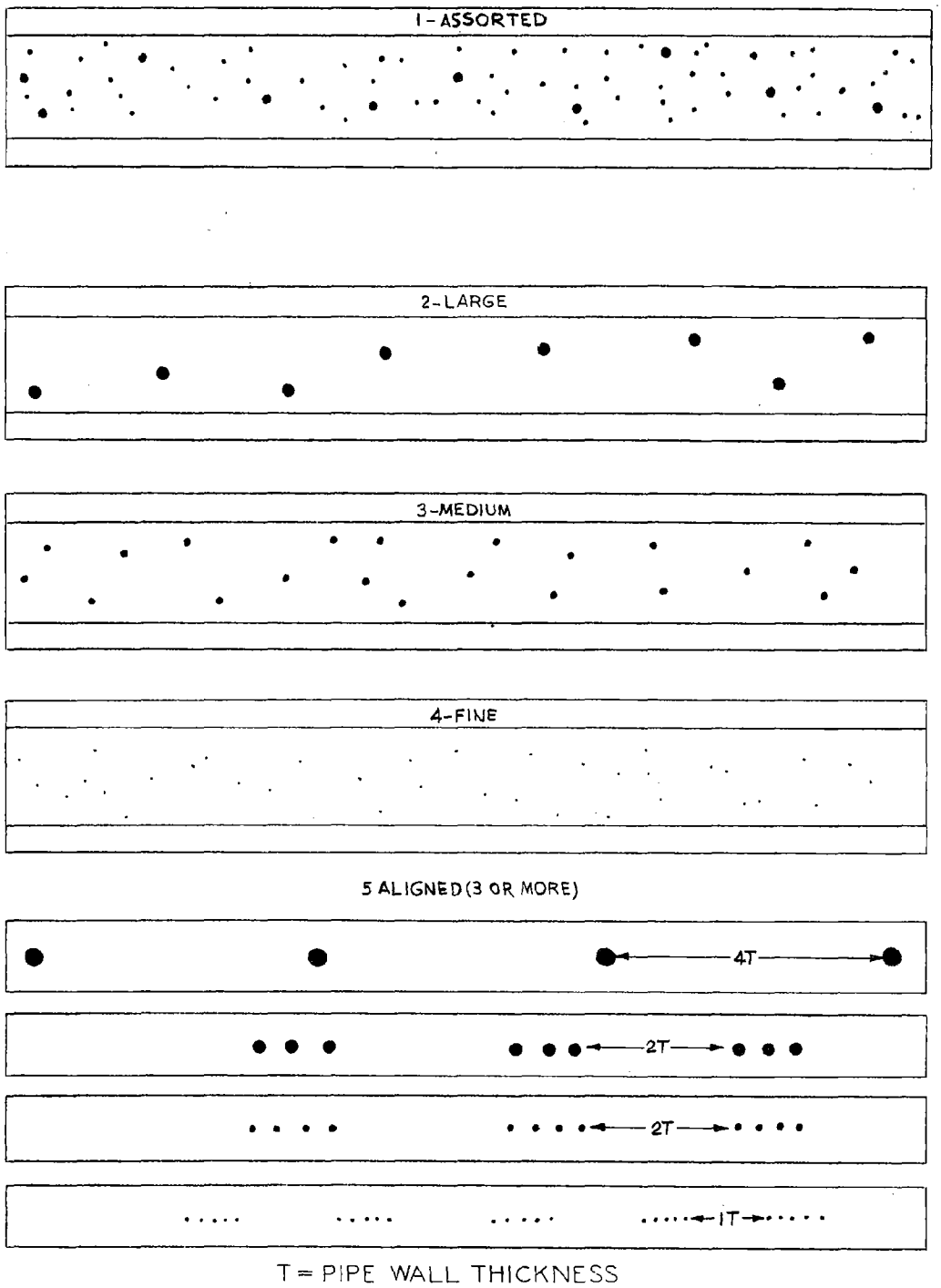
APPROVED BY							
	2	12-21-76	REVISED TITLE, ADDED DEFINITION OF "T" AND NOTE				
	1	3-10-71	CHANGED PAGE NO. TO 29				
	CHG.	DATE	DESCRIPTION	GM	BY	CH.	APPD.

SUPV. BY	DEPT. OF G.O.
DSGN.	
DR.	
CH.	
O.K.	
DATE	1-5-65
SCALE	NONE

PIPING-DATA SHEET
MAXIMUM DISTRIBUTION OF GAS POCKETS WALL THICKNESS OVER 1/2" TO 1-1/4"
GAS STANDARD

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

DRAWING LIST	
SUPERSEDES	083466 SH. 6
SUPERSEDED BY	
SHEET NO.	SHEETS
DRAWING NUMBER	CHANGE
084026	2



T = PIPE WALL THICKNESS

NOTE: SEE SECTION 2.8 FOR MAXIMUM ALLOWABLE SIZE OF GAS POCKETS.

APPROVED BY							
	2	12-21-76	REVISED TITLE, ADDED DEFINITION OF "T" AND NOTE.				
	1	3-10-71	CHANGED PAGE NO. TO 30				
RJK	CHG.	DATE	DESCRIPTION	GM	BY	CH.	APPD.

SUPV. BY	PIPING-DATA SHEET	DRAWING LIST	
DSGN.	MAXIMUM DISTRIBUTION OF GAS POCKETS	SUPERSEDES	083466 SH. 7
DR. [redacted]	WALL THICKNESS 1/2" OR LESS	SUPERSEDED BY	
CH.	GAS STANDARD	SHEET NO.	SHEETS
O.K.	PACIFIC GAS AND ELECTRIC COMPANY	DRAWING NUMBER	CHANGE
DATE 1-5-65 / SCALE NONE	SAN FRANCISCO, CALIFORNIA	084025	2